Intermec Technologies Corporation

700C with CDMA, 802.11(b), and RFID

December 16, 2003

Report No. ITRM0006

Report Prepared By:

NORTHWEST EMC

1-888-EMI-CERT

Test Report

NORTHWEST EMC

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Issue Date: December 16, 2003
Intermec Technologies Corporation
Model: 700C with CDMA, 802.11(b), and RFID

Emissions		
Description	**Pass**	**Fail**
FCC 22.917 Spurious Radiated Emissions:2003	☒	☐
FCC 24.238 Spurious Radiated Emissions:2003	☒	☐

Modifications made to the product

See the Modifications section of this report

Test Facility

- The measurement facility used to collect the data is located at:
  Northwest EMC, Inc.; 22975 NW Evergreen Parkway, Suite 400; Hillsboro, OR 97124
  Phone: (503) 844-4066 Fax: 844-3826
  This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada.

Approved By:

Don Facteau, IS Manager

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested, the specific description is noted in each of the individual sections of the test report supporting this certificate of test.

Revision History

Revision Number	Description	Date	Page Number
00	None		

FCC: The Open Area Test Sites, and conducted measurement facilities, have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files.

TCB: Northwest EMC has been accredited by ANSI to ISO/IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.

NVLAP: Accreditation has been granted to Northwest EMC, Inc. to perform the Electromagnetic Compatibility (EMC) tests described in the Scope of Accreditation. Assessment performed to ISO/IEC 17025. Certificate Number: 200629-0, Certificate Number: 200630-0.

Australia/New Zealand: The National Association of Testing Authorities (NATA), Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body. (NVLAP)

TÜV Product Service: Included in TUV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TUV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TUV's current Listing of CARAT Laboratories available from TUV. A certificate was issued to represent that this laboratory continues to meet TUV's CARAT Program requirements. Certificate No. USA0302C

TÜV Rheinland: Authorized to carryout EMC tests by order and under supervision of TÜV Rheinland. This authorization is based on "Conditions for EMC-Subcontractors" of November 1992.

NEMKO: Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119).	
Technology International: Assessed in accordance with ISO Guide 25 defining the general international requirements for the competence of calibration and testing laboratories and with ITI assessment criteria LACO196. Based upon that assessment Interference Technology International, Ltd., has granted approval for specifications implementing the EU Directive on EMC (89/336/EEC and amendments). The scope of the approval was provided on a Schedule of Assessment supplied with the certificate and is available upon request.	
Industry Canada: Accredited by Industry Canada for performance of radiated measurements. Our open area test sites comply with RSS 212, Issue 1 (Provisional).	
VCCI: Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. *(Registration Nos. - Evergreen: C-1071 and R-1025, Trails End: C-1877 and R-1760, Sultan: C-905, R-871, C-1784 and R-1761, North Sioux City C-1246 and R-1217)*	
BSMI: Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement. License No.SL2-IN-E-1017.	
CAB: Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement	
GOST: Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification	

	NVLAP	FCC	NIST	TUV PS	TUV Rheinland	Nemko	Technology International	Industry Canada	BSMI	VCCI	GOST	NATA
IEC 61000-4-2	✓			✓	✓	✓	✓					
IEC 61000-4-3	✓			✓	✓	✓	✓					
IEC 61000-4-4	✓			✓	✓	✓	✓					
IEC 61000-4-5	✓			✓	✓	✓	✓					
IEC 61000-4-6	✓			✓	✓	✓	✓					
IEC 61000-4-8	✓			✓	✓	✓	✓					
IEC 61000-4-11	✓			✓	✓	✓	✓					
IEC 61000-3-2	✓			✓	✓	✓	✓					
IEC 61000-3-3	✓			✓	✓	✓	✓					
AS/NZS 3548	✓											✓
CNS 13438	✓								✓			
ISO/IEC17025	✓			✓	✓	✓	✓		✓			
Radiated Emissions	✓			✓	✓	✓	✓	✓	✓	✓	✓	
Conducted Emissions	✓			✓	✓	✓	✓	✓	✓	✓	✓	
OATS Sites	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	
Hillsboro 5-Meter Chamber (EV01)	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	
TCB for Licensed Transmitters		✓										
TCB for un-Licensed Transmitters		✓										
Cab for R&TTE			✓									
CAB for EMC			✓									

This chart represents only a partial NVLAP Scope, please reference http://ts.nist.gov/ts/htdocs/210/214/214.htm for the full NVLAP Scope of Accreditation

What is measurement uncertainty?

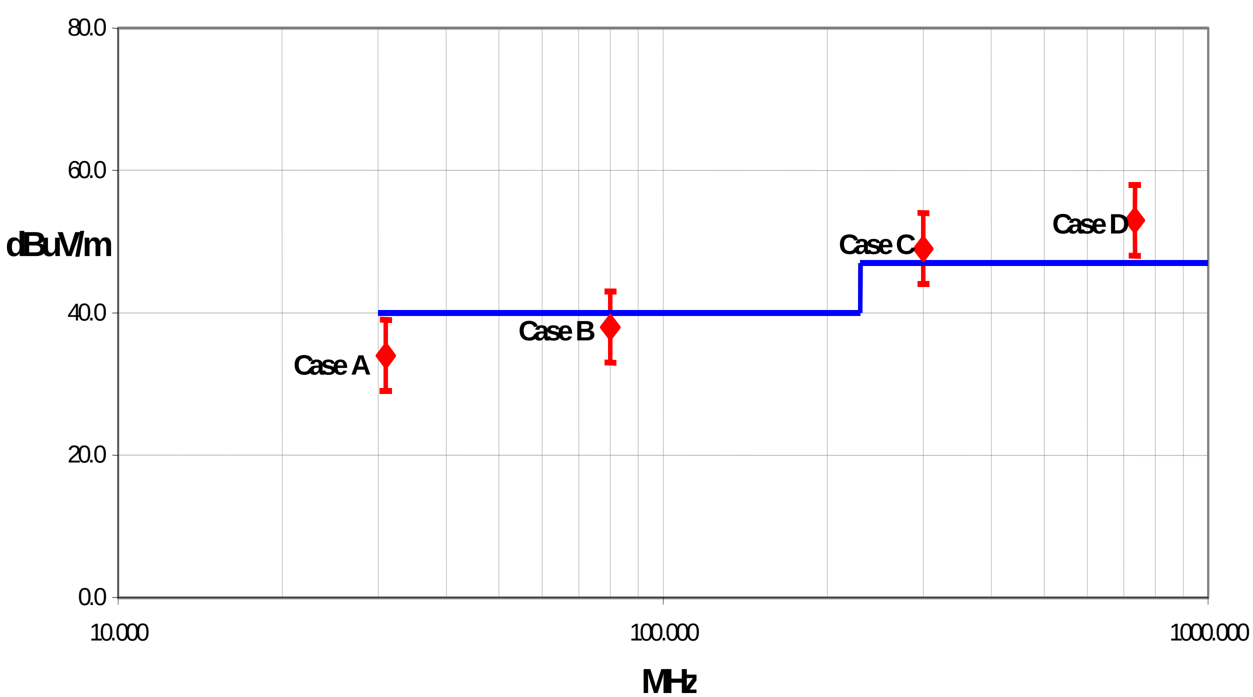
When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. The following statement of measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" value. In the case of transient tests (ESD, EFT, Surge, Voltage Dips and Interruptions), the test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements.

The following documents were the basis for determining the uncertainty levels of our measurements:

- "ISO Guide to the Expression of Uncertainty in Measurements", October 1993
- "NIS81: The Treatment of Uncertainty in EMC Measurements", May 1994
- "IEC CISPR 16-3 A1 f1 Ed.1: Radio-interference measurements and statistical techniques", December 2000

How might measurement uncertainty be applied to test results?

If the diamond marks the measured value for the test and the vertical bars bracket the range of + and – measurement uncertainty, then test results can be interpreted from the diagram below.



Test Result Scenarios:
Case A: Product complies.
Case B: Product conditionally complies. It is not possible to say with 95% confidence that the product complies.
Case C: Product conditionally does not comply. It is not possible to say with 95% confidence that the product does not comply.
Case D: Product does not comply.

Radiated Emissions ≤ 1 GHz	Value (dB)						
	Probability Distribution	Biconical Antenna		Log Periodic Antenna		Dipole Antenna	
Test Distance		3m	10m	3m	10m	3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.86 - 1.88	+ 1.82 - 1.87	+ 2.23 - 1.41	+ 1.29 - 1.26	+ 1.31 - 1.27	+ 1.25 - 1.25
Expanded uncertainty ***U*** (level of confidence ≈ 95%)	normal (k=2)	+ 3.72 - 3.77	+ 3.64 - 3.73	+ 4.46 -2.81	+ 2.59 - 2.52	+ 2.61 - 2.55	+ 2.49 - 2.49

Radiated Emissions > 1 GHz	Value (dB)		
	Probability Distribution	Without High Pass Filter	With High Pass Filter
Combined standard uncertainty $u_c(y)$	normal	+ 1.29 - 1.25	+ 1.38 - 1.35
Expanded uncertainty ***U*** (level of confidence ≈ 95%)	normal (k=2)	+ 2.57 - 2.51	+ 2.76 - -2.70

Conducted Emissions		
	Probability Distribution	Value (+/- dB)
Combined standard uncertainty ***uc(y)***	normal	1.48
Expanded uncertainty ***U*** (level of confidence ≈ 95 %)	normal (k = 2)	2.97

Radiated Immunity		
	Probability Distribution	Value (+/- dB)
Combined standard uncertainty ***uc(y)***	normal	1.05
Expanded uncertainty ***U*** (level of confidence ≈ 95 %)	normal (k = 2)	2.11

Conducted Immunity		
	Probability Distribution	Value (+/- dB)
Combined standard uncertainty ***uc(y)***	normal	1.05
Expanded uncertainty ***U*** (level of confidence ≈ 95 %)	normal (k = 2)	2.10

Legend

$u_c(y)$ = square root of the sum of squares of the individual standard uncertainties

U = combined standard uncertainty multiplied by the coverage factor: **k**. This defines an interval about the measured result that will encompass the true value with a confidence level of approximately 95%. If a higher level of confidence is required, then k=3 (CL of 99.7%) can be used. Please note that with a coverage factor of one, uc(y) yields a confidence level of only 68%.

California

Orange County Facility

41 Tesla Ave.
Irvine, CA 92618
(888) 364-2378
FAX (503) 844-3826

Oregon

Evergreen Facility

22975 NW Evergreen Pkwy.,
Suite 400
Hillsboro, OR 97124
(503) 844-4066
FAX (503) 844-3826

Oregon

Trails End Facility

30475 NE Trails End Lane
Newberg, OR 97132
(503) 844-4066
FAX (503) 537-0735

South Dakota

North Sioux City Facility

745 N. Derby Lane
P.O. Box 217
North Sioux City, SD 57049
(605) 232-5267
FAX (605) 232-3873

Washington

Sultan Facility

14128 339th Ave. SE
Sultan, WA 98294
(888) 364-2378
FAX (360) 793-2536

Product Description

Party Requesting the Test	
Company Name:	Intermec Technologies Corporation
Address:	550 Second St. SE
City, State, Zip:	Cedar Rapids, IA 52401-2023
Test Requested By:	Dave Fry
Model:	700C with CDMA, 802.11b, and RFID
First Date of Test:	November 21, 2003
Last Date of Test:	November 26, 2003
Receipt Date of Samples:	November 20, 2003
Equipment Design Stage:	Production
Equipment Condition:	No visual damage.

Information Provided by the Party Requesting the Test

Clocks/Oscillators:	Not provided at the time of test
I/O Ports:	none

Functional Description of the EUT (Equipment Under Test):
Handheld computer with three internal radios used for inventory control

Client Justification for EUT Selection:
The product is a representative production sample.

Client Justification for Test Selection:
These test satisfy the requirements of FCC 22.917(e) and FCC 24.238 for co-located transmitters.

Modifications

Equipment modifications					
Item	Test	Date	Modification	Note	Disposition of EUT
1	Spurious Radiated Emissions	11-21 thru 11-26-2003	No EMI suppression devices were added or modified during this test.	Same configuration as delivered.	EUT was returned to client following testing.

Justification

The EUT is a CDMA radio module installed inside Intermec's handheld computer, Model 700C. The 700C also contains two other co-located radio modules (802.11(b) and Bluetooth). The EUT has been previously certified (FCC ID: HN2SB555-2) for portable use with these two other radios (FCC ID: HN22011B-2 and FCC ID: HN2ABTM3-3). This test demonstrates compliance with FCC 22.917 and FCC 24.238 emissions limits while the EUT is co-located with another previously certified RFID radio (FCC ID: EHARFID915PCC-6). This new RFID radio is internal to a pistol grip (Model IP3). The IP3 is an optional accessory that attaches externally to the bottom of the 700C. Since the IP3 uses the same IRDA interface port as the Bluetooth radio, the Bluetooth and RFID radios cannot transmit simultaneously (see Intermec's attestation letter). All other radios can transmit simultaneously. Each radio transmits through its own antenna.

All possible combinations of harmonic emissions from the CDMA, 802.11(b) and RFID radios were compared numerically. It was determined that there were no possible coincidental harmonics below 1 GHz. All the radios were configured for simultaneous transmission at the channels specified below:

Channels in Specified Band Investigated (when CDMA radio is operating in Cellular Band):	
CDMA (Cellular Band):	310, 477, 602, 727
RFID:	12, 47, 71, 73
802.11(b):	1, 5, 8, 11

Channels in Specified Band Investigated (when CDMA radio is operating in PCS Band):	
CDMA (PCS Band):	41, 932, 1117, 1182,
RFID:	7, 8, 12, 50, 62, 69,
802.11(b):	1, 11

Operating Modes Investigated:
Simultaneous Transmission of CDMA Cellular Channel 477, RFID Channel 12, and 802.11(b) Channel 1
Simultaneous Transmission of CDMA Cellular Channel 727, RFID Channel 47, and 802.11(b) Channel 8
Simultaneous Transmission of CDMA Cellular Channel 602, RFID Channel 73, and 802.11(b) Channel 1
Simultaneous Transmission of CDMA Cellular Channel 310, RFID Channel 71, and 802.11(b) Channel 5
Simultaneous Transmission of CDMA Cellular Channel 310, RFID Channel 71, and 802.11(b) Channel 11
Simultaneous Transmission of CDMA PCS Channel 41, RFID Channel 69, and 802.11(b) Channel 11
Simultaneous Transmission of CDMA PCS Channel 1182, RFID Channel 12, and 802.11(b) Channel 1
Simultaneous Transmission of CDMA PCS Channel 1117, RFID Channel 7, and 802.11(b) Channel 11
Simultaneous Transmission of CDMA PCS Channel 932, RFID Channel 8, and 802.11(b) Channel 11
Simultaneous Transmission of CDMA PCS Channel 1117, RFID Channel 50, and 802.11(b) Channel 1
Simultaneous Transmission of CDMA PCS Channel 1117, RFID Channel 62, and 802.11(b) Channel 1
Simultaneous Transmission of CDMA PCS Channel 1182, RFID Channel 7, and 802.11(b) Channel 11

Antennas Investigated:	
CDMA (Cellular Band):	805-606-002 Antenna (external to 700C)
CDMA (PCS Band):	805-606-004 Antenna (external to 700C)
RFID:	IP3 integral antenna (internal to IP3)
802.11(b):	2011B integral antenna (internal to 700C)

Output Power Setting(s) Investigated:
Maximum

Data Rate(s) Investigated:
Maximum

Power Input Settings Investigated:
120VAC, 60Hz
Battery

Frequency Range Investigated			
Start Frequency	1 GHz	**Stop Frequency**	25 GHz

Software\Firmware Applied During Test			
Exercise software	Intel 802.11 AgencyTest Core IP3FCC2	**Version(s)**	unknown unknown v0.4
Description			
The system uses special software designed to exercise the functions of the device such as transmit/receive, channel, modulation, data rates, and simultaneous transmission of all three co-located radios.			

EUT and Peripherals			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Handheld Computer	Intermec Technologies Corporation	700C	N/A
CDMA Radio in 700C	Intermec Technologies Corporation	SB555	N/A
802.11(b) Radio in 700C	Intermec Technologies Corporation	2011B	N/A
RFID Radio in Pistol Grip	Intermec Technologies Corporation	IP3	N/A
Power Adapter	Elpac Power Systems	FW1812	004506
Cellular Antenna	Intermec Technologies Corporation	805-606-002	N/A
Cellular Antenna	Intermec Technologies Corporation	805-606-004	N/A

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Leads	PA	1.8	PA	Handheld Radio/Scanner	Power Adapter
AC Power	No	1.8	No	Power Adapter	AC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Measurement Equipment					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Cal**	**Interval**
High Pass Filter	RLC Electronics	F-100-4000-5-R (HPF>4GHz up to	HFF	05/01/2003	12 mo
Antenna, Biconilog	EMCO	3142	AXA	11/07/2002	36 mo
Pre-Amplifier	Amplifier Research	LN1000A	APS	01/06/2003	12 mo
Antenna, Horn	EMCO	3115	AHC	09/18/2003	12 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APJ	01/06/2003	12 mo
Antenna, Horn	EMCO	3160-08	AHK	06/20/2003	12 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APC	10/08/2003	12 mo
Antenna, Horn	EMCO	3160-09	AHG	10/08/2003	12 mo
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	10/08/2003	12 mo
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	01/07/2003	12 mo
Spectrum Analyzer Display	Hewlett Packard	85662A	AALD	01/07/2003	12 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	01/07/2003	12 mo
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo
High Pass Filter	Hewlett-Packard	84300-80037	HFE	05/01/2003	12 mo

Test Description

Requirement: Per 2.1053, the field strength of spurious radiation was measured in the far-field at an FCC Listed semi-anechoic chamber up to 25 GHz. The applicable limits are 22.917(e) for the cellular band, and 24.238(a) for the PCS band.

Per 22.917(e), the mean power of out of band emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at least 43 + 10 log (P) dB. (-13 dBm).

Per 24.238(a), on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB. (-13 dBm).

Configuration: Spectrum analyzer, signal generator, and linearly polarized antennas were used to measure radiated harmonics and spurious emissions. The orientation of the EUT and measurement antenna were manipulated to maximize the level of emissions.

The substitution method as described in TIA/EIA-603 Section 2.2.12 was used for the highest spurious emissions. The EUT was tested while simultaneously transmitting with co-located radios.

Test Methodology: For licensed transmitters, the FCC references TIA/EIA-603 as the measurement procedure standard. TIA/EIA-603 Section 2.2.12 describes a method for measuring radiated spurious emissions that utilizes an antenna substitution method:

At an approved test site, the transmitter is place on a remotely controlled turntable, and the measurement antenna is placed 3 meters from the transmitter. The turntable azimuth is varied to maximize the level of spurious emissions. The height of the measurement antenna is also varied from 1 to 4 meters. The amplitude and frequency of the highest emissions are noted. The transmitter is then replaced with a ½ wave dipole that is successively tuned to each of the highest spurious emissions. A signal generator is connected to the dipole (horn antenna for frequencies above 1 GHz), and its output is adjusted to match the level previously noted for each frequency. The output of the signal generator is recorded, and by factoring in the cable loss to the dipole antenna and its gain; the power (dBm) into an ideal ½ wave dipole antenna is determined for each radiated spurious emission.

Simultaneous Transmission: The EUT is a CDMA radio module installed inside Intermec's handheld computer, Model 700C. The 700C also contains two other co-located radio modules (802.11(b) and Bluetooth). The EUT has been previously certified (FCC ID: HN2SB555-2) for portable use with these two other radios (FCC ID: HN22011B-2 and FCC ID: HN2ABTM3-3). This test demonstrates compliance with FCC 22.917 and FCC 24.238 emissions limits while the EUT is co-located with another previously certified mobile radio (FCC ID: EHARFID915PCC-6). This new RFID radio is internal to a pistol grip (Model IP3). The IP3 is an optional accessory that attaches externally to the bottom of the 700C. Since the IP3 uses the same IRDA interface port as the Bluetooth radio, the Bluetooth and RFID radios cannot transmit simultaneously (see Intermec's attestation letter). All other radios can transmit simultaneously. Each radio transmits through its own antenna.

The following is an excerpt from the FCC / TCB Training Q & A, October 2002, Day 2, Question 7:

> **Assuming that the radios do not share an antenna, only radiated tests for simultaneous transmission is required. If the radios share an antenna, antenna conducted measurements would also be required. Only one set of worst case simultaneous transmission data is going to be requested to be submitted at this time. The test engineer should indicate the worst case condition and provide justification as to why the worst case condition was chosen. The grantee should be reminded that even if the FCC requests one set of data, they are responsible for compliance for all modes of simultaneous transmission.**

All possible combinations of harmonic emissions from the CDMA, 802.11(b) and RFID radios were compared numerically. It was determined that there were no possible coincidental harmonics below 1 GHz.. The frequency range from 1 GHz to 25 GHz was investigated for channel combinations that would produce coincidental harmonics. Compliance with the restricted band at 2483.5 – 2500 MHz was also measured.

All the radios were configured for simultaneous transmission at the channels specified in the previous pages. The highest gain antennas to be used with the radios were tested. The spectrum was scanned throughout the specified range. While scanning, emissions from the radios were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antennas in three orthogonal axes, and adjusting the measurement antenna height and polarization (per ANSI C63.4:1992). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Bandwidths Used for Measurements			
Frequency Range (MHz)	**Peak Data (kHz)**	**Quasi-Peak Data (kHz)**	**Average Data (kHz)**
0.01 – 0.15	1.0	0.2	0.2
0.15 – 30.0	10.0	9.0	9.0
30.0 – 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0
Measurements were made using the bandwidths and detectors specified. No video filter was used.			

Completed by:

NORTHWEST
EMC

Apparent Power Data Sheet

REV df4.01 10/02/2003

EUT:	**700C (CDMA/8012.11b/RFID)**	**Work Order:**	**ITRM0004**
Serial Number:		**Date:**	**11/24/03**
Customer:	**Intermec Technologies Corporation**	**Temperature:**	**72**
Attendees:	**none**	**Humidity:**	**34%**
Cust. Ref. No.:		**Barometric Pressure**	**30.13**
Tested by:	**Holly Ashkannejhad** **Power:** **120 V, 60 Hz**	**Job Site:**	**EV01**

TEST SPECIFICATIONS

Specification:	**FCC 22.917(e)**	**Year:**	**2003**
Method:	**TIA/EIA-603**	**Year:**	**1998**

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

Max Power, Max modulation.

EUT OPERATING MODES

Simultaneous Transmission from RFID, 802.11b, CDMA (Cellular)

DEVIATIONS FROM TEST STANDARD

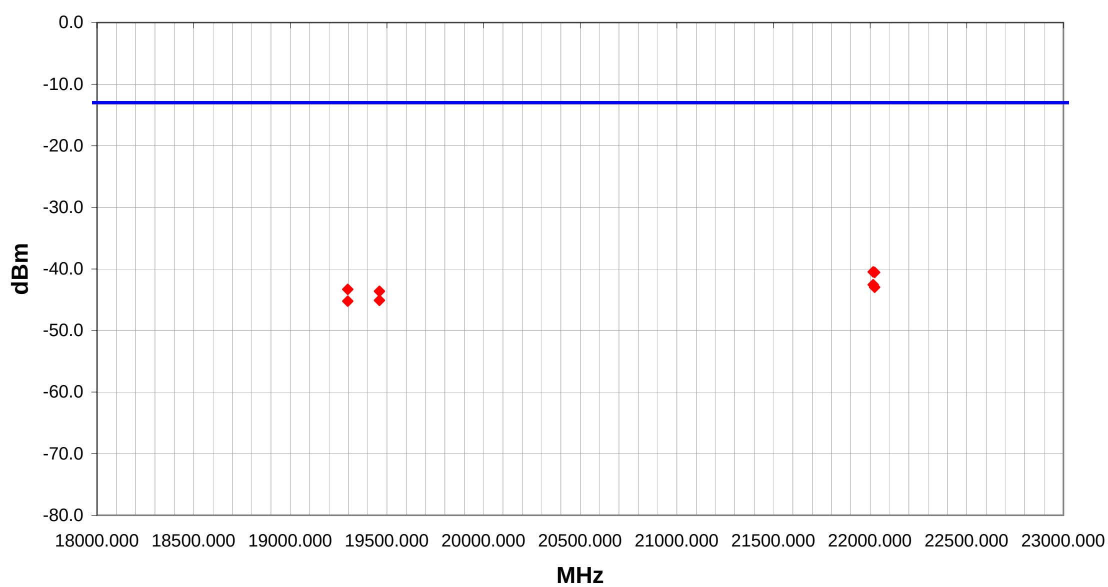
No deviations.

RESULTS	**Run #**
Pass	**2**

Other

Holly Ashkannejhad

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector		EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
22016.000			0.0	1.1			V-High Horr	PK		-40.5	-13.0	-27.5	RFID 47, CDMA 727, 802.11b 8
22023.000			0.0	1.1			V-High Horr	PK		-40.6	-13.0	-27.6	RFID 47, CDMA 727, 802.11b 8
22016.000			0.0	1.1			H-High Horr	PK		-42.6	-13.0	-29.6	RFID 47, CDMA 727, 802.11b 8
22023.000			0.0	1.1			H-High Horr	PK		-43.0	-13.0	-30.0	RFID 47, CDMA 727, 802.11b 8
19297.500			0.0	1.1			V-High Horr	PK		-43.3	-13.0	-30.3	RFID 12, CDMA 477, 802.11b 1
19460.690			0.0	1.1			V-High Horr	PK		-43.6	-13.0	-30.6	RFID 71, CDMA 310, 802.11b 5
19460.690			0.0	1.1			H-High Horr	PK		-45.1	-13.0	-32.1	RFID 71, CDMA 310, 802.11b 5
19297.500			0.0	1.1			H-High Horr	PK		-45.2	-13.0	-32.2	RFID 12, CDMA 477, 802.11b 1

NORTHWEST
EMC

Apparent Power Data Sheet

REV df4.01 10/02/2003

EUT:	**700C (CDMA/8012.11b/RFID)**	**Work Order:**	**ITRM0004**
Serial Number:		**Date:**	**11/25/03**
Customer:	**Intermec Technologies Corporation**	**Temperature:**	**72**
Attendees:	**none**	**Humidity:**	**52%**
Cust. Ref. No.:		**Barometric Pressure**	**30.08**
Tested by:	**Rod Peloquin** **Power: 120 V, 60 Hz**	**Job Site:**	**EV01**

TEST SPECIFICATIONS

Specification:	**FCC 22.917(e)**	**Year:**	**2003**
Method:	**TIA/EIA-603**	**Year:**	**1998**

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

Max Power, Max modulation.

EUT OPERATING MODES

Simultaneous Transmission from RFID, 802.11b, CDMA (Cellular)

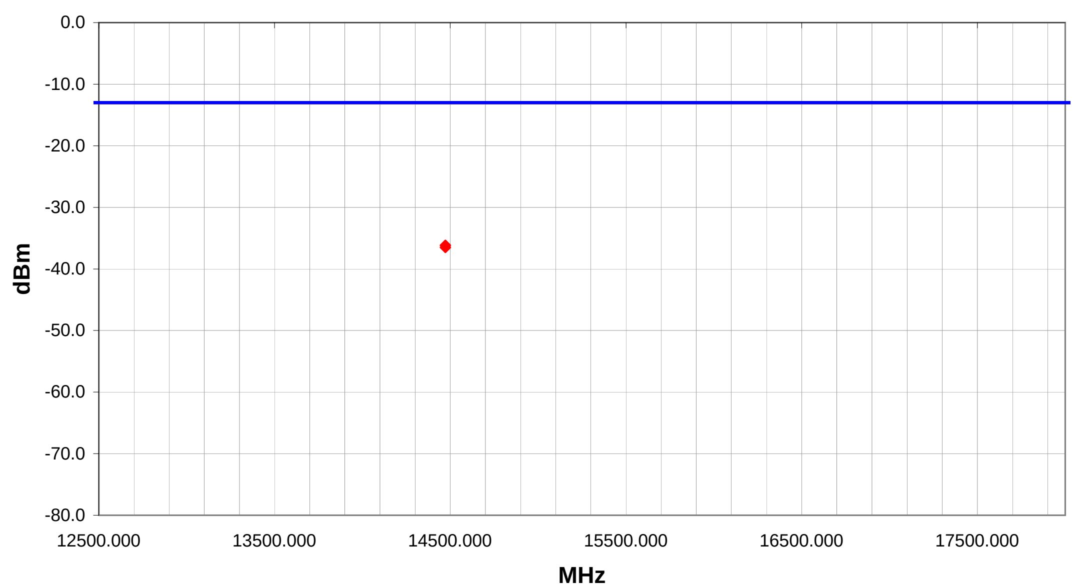
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	**Run #**
Pass	**3**

Other

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector		EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
14472.000			19.0	1.6			H-Horn	PK		-36.2	-13.0	-23.2	RFID 12, CDMA 477, 802.11b 1
14472.000			225.0	1.2			V-Horn	PK		-36.5	-13.0	-23.5	RFID 12, CDMA 477, 802.11b 1

NORTHWEST
EMC

Apparent Power Data Sheet

REV df4.01 10/02/2003

EUT:	**700C (CDMA/8012.11b/RFID)**	**Work Order:**	**ITRM0004**
Serial Number:		**Date:**	**11/25/03**
Customer:	**Intermec Technologies Corporation**	**Temperature:**	**72**
Attendees:	**none**	**Humidity:**	**52%**
Cust. Ref. No.:		**Barometric Pressure**	**30.08**
Tested by:	**Rod Peloquin** **Power:** **120 V, 60 Hz**	**Job Site:**	**EV01**

TEST SPECIFICATIONS

Specification:	**FCC 22.917(e)**	**Year:**	**2003**
Method:	**TIA/EIA-603**	**Year:**	**1998**

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

Max Power, Max modulation

EUT OPERATING MODES

Simultaneous Transmission from RFID, 802.11b, CDMA (Cellular)

DEVIATIONS FROM TEST STANDARD

No deviations.

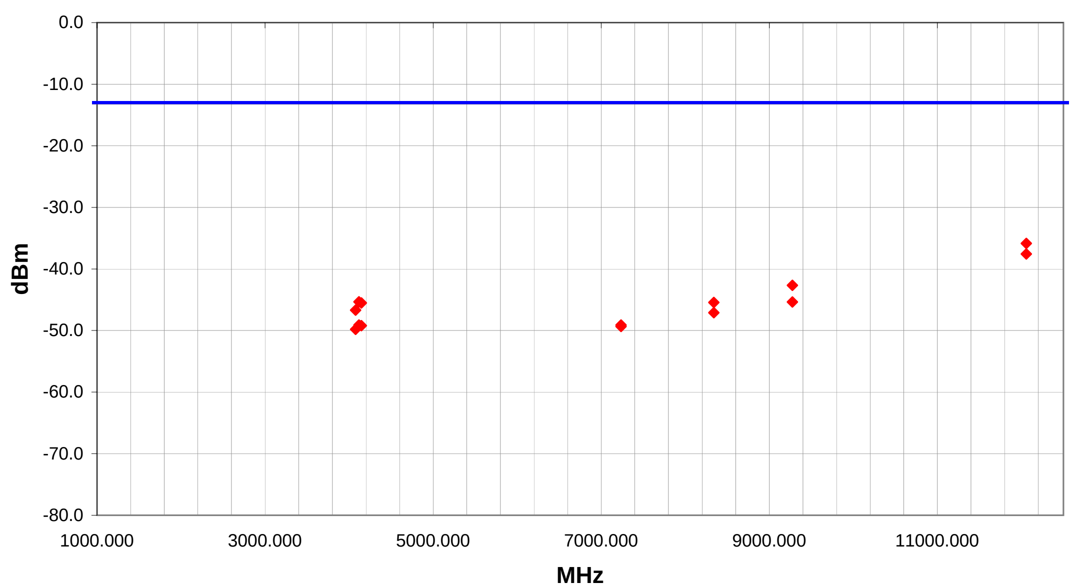
RESULTS

Pass

Run # 4

Other

Tested By:



Freq (MHz)	Azimuth (degrees)	Height (meters)	Polarity	Detector	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
12058.000	13.0	1.7	H-Horn	PK	-35.9	-13.0	-22.9	RFID 73, CDMA 602, 802.11b 1
12058.000	246.0	1.2	V-Horn	PK	-37.6	-13.0	-24.6	RFID 73, CDMA 602, 802.11b 1
9275.500	132.0	1.3	H-Horn	PK	-42.7	-13.0	-29.7	RFID 73, CDMA 602, 802.11b 1
4115.900	22.0	1.3	H-Horn	PK	-45.3	-13.0	-32.3	RFID 71, CDMA 310, 802.11b 5
9275.500	203.0	1.2	V-Horn	PK	-45.4	-13.0	-32.4	RFID 73, CDMA 602, 802.11b 1
8339.813	347.0	1.3	H-Horn	PK	-45.5	-13.0	-32.5	RFID 71, CDMA 310, 802.11b 5
4145.970	8.0	1.3	H-Horn	PK	-45.5	-13.0	-32.5	RFID 47, CDMA 727, 802.11b 8
4075.980	6.0	1.6	H-Horn	PK	-46.7	-13.0	-33.7	RFID 12, CDMA 477, 802.11b 1
8339.813	144.0	1.2	V-Horn	PK	-47.1	-13.0	-34.1	RFID 71, CDMA 310, 802.11b 5
7236.120	333.0	1.2	V-Horn	PK	-49.1	-13.0	-36.1	RFID 12, CDMA 477, 802.11b 1
4115.900	129.0	1.2	V-Horn	PK	-49.1	-13.0	-36.1	RFID 71, CDMA 310, 802.11b 5
4145.970	137.0	1.2	V-Horn	PK	-49.2	-13.0	-36.2	RFID 47, CDMA 727, 802.11b 8
7236.000	75.0	1.4	H-Horn	PK	-49.3	-13.0	-36.3	RFID 12, CDMA 477, 802.11b 1
4075.890	131.0	1.2	V-Horn	PK	-49.8	-13.0	-36.8	RFID 12, CDMA 477, 802.11b 1

NORTHWEST
EMC

Apparent Power Data Sheet

REV
df4.01
10/02/2003

EUT:	**700C (CDMA/8012.11b/RFID)**	**Work Order:**	**ITRM0004**
Serial Number:		**Date:**	**11/25/03**
Customer:	**Intermec Technologies Corporation**	**Temperature:**	**72**
Attendees:	**none**	**Humidity:**	**52%**
Cust. Ref. No.:		**Barometric Pressure**	**30.08**
Tested by:	**Rod Peloquin** **Power:** **120 V, 60 Hz**	**Job Site:**	**EV01**

TEST SPECIFICATIONS

Specification:	**FCC 22.917(e)**	**Year:**	**2003**
Method:	**TIA/EIA-603**	**Year:**	**1998**

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

Max Power, Max modulation

EUT OPERATING MODES

Simultaneous Transmission from RFID, 802.11b, CDMA (Cellular)

DEVIATIONS FROM TEST STANDARD

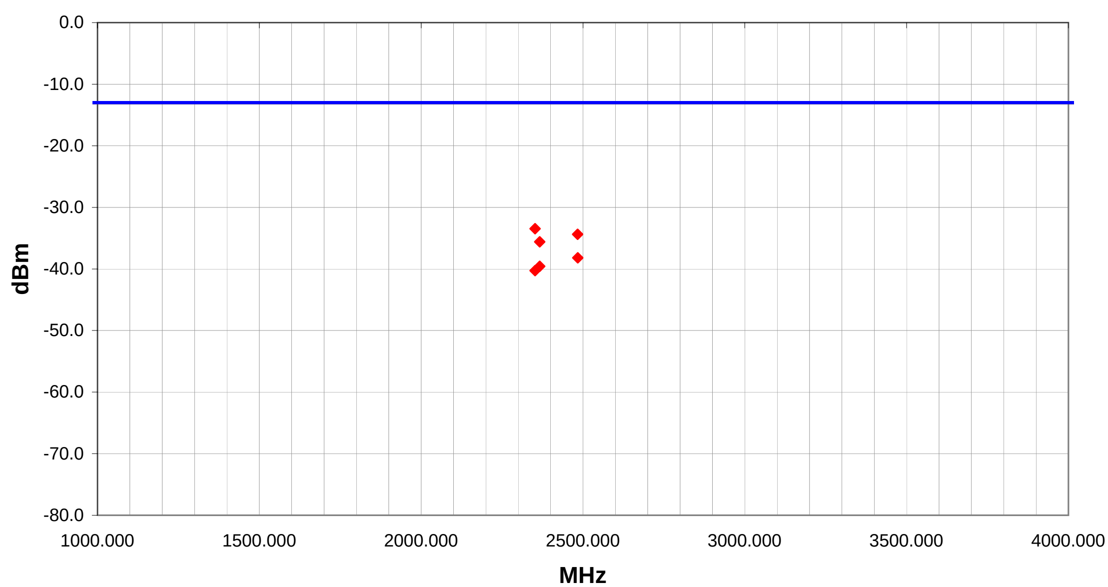
No deviations.

RESULTS

RESULTS	Run #
Pass	5

Other

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector		EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
2351.992			91.0	1.2			V-Horn	PK		-33.5	-13.0	-20.5	RFID 71, CDMA 310, 802.11b 11
2483.500			46.0	1.1			V-Horn	PK		-34.4	-13.0	-21.4	RFID 71, CDMA 310, 802.11b 11
2366.530			63.0	1.2			V-Horn	PK		-35.6	-13.0	-22.6	RFID 71, CDMA 310, 802.11b 11
2483.740			360.0	1.2			H-Horn	PK		-38.2	-13.0	-25.2	RFID 71, CDMA 310, 802.11b 11
2366.530			310.0	1.3			H-Horn	PK		-39.6	-13.0	-26.6	RFID 71, CDMA 310, 802.11b 11
2351.992			252.0	1.3			H-Horn	PK		-40.3	-13.0	-27.3	RFID 71, CDMA 310, 802.11b 11

NORTHWEST
EMC

Apparent Power Data Sheet

REV
df4.01
10/02/2003

EUT:	**700C (CDMA/8012.11b/RFID)**	**Work Order:**	**ITRM0004**
Serial Number:		**Date:**	**11/24/03**
Customer:	**Intermec Technologies Corporation**	**Temperature:**	**72**
Attendees:	**none**	**Humidity:**	**34%**
Cust. Ref. No.:		**Barometric Pressure**	**30.13**
Tested by:	**Holly Ashkannejhad** **Power:** **120 V, 60 Hz**	**Job Site:**	**EV01**

TEST SPECIFICATIONS

Specification:	**FCC 24.238(a)**	**Year:**	**2003**
Method:	**TIA/EIA-603**	**Year:**	**1998**

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

Max Power, Max modulation.

EUT OPERATING MODES

Simultaneous Transmission from RFID, 802.11b, CDMA (PCS)

DEVIATIONS FROM TEST STANDARD

No deviations.

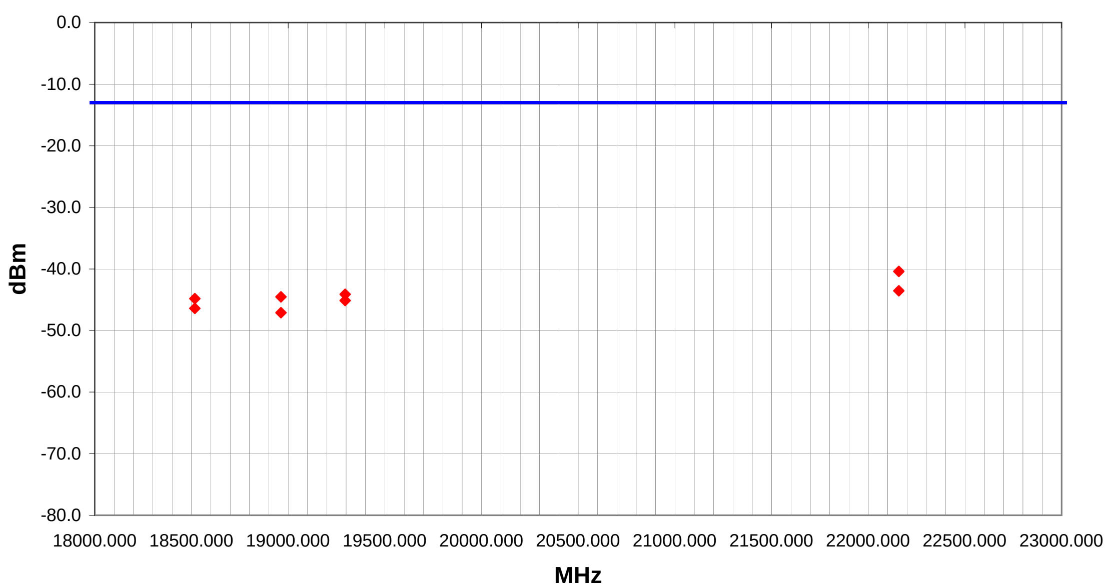
RESULTS

Pass	**Run #** 1

Other

Holly Ashkannejhad

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector		EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
22158.000			0.0	1.1			V-High Horr	PK		-40.4	-13.0	-27.4	RFID 62, PCS 117, 802.11b 11
22158.000			0.0	1.1			H-High Horr	PK		-43.5	-13.0	-30.5	RFID 62, PCS 117, 802.11b 11
19294.880			0.0	1.1			V-High Horr	PK		-44.1	-13.0	-31.1	RFID 50, PCS 1117, 802.11b 1
18963.000			0.0	1.1			V-High Horr	PK		-44.5	-13.0	-31.5	RFID 8, PCS932, 802.11b 11
18517.500			0.0	1.1			V-High Horr	PK		-44.8	-13.0	-31.8	RFID 69, PCS 41, 802.11b 11
19294.880			0.0	1.1			H-High Horr	PK		-45.1	-13.0	-32.1	RFID 50, PCS 1117, 802.11b 1
18517.500			0.0	1.1			H-High Horr	PK		-46.4	-13.0	-33.4	RFID 69, PCS 41, 802.11b 11
18963.000			0.0	1.1			H-High Horr	PK		-47.1	-13.0	-34.1	RFID 8, PCS932, 802.11b 11

NORTHWEST
EMC

Apparent Power Data Sheet

REV
df4.01
10/02/2003

EUT:	**700C (CDMA/8012.11b/RFID)**	**Work Order:**	**ITRM0004**
Serial Number:		**Date:**	**11/21/03**
Customer:	**Intermec Technologies Corporation**	**Temperature:**	**70**
Attendees:	**Scott Holub**	**Humidity:**	**52%**
Cust. Ref. No.:		**Barometric Pressure**	**30.11**
Tested by:	**Greg Kiemel** **Power:** **120 V, 60 Hz**	**Job Site:**	**EV01**

TEST SPECIFICATIONS

Specification:	**FCC 24.238(a)**	**Year:**	**2003**
Method:	**TIA/EIA-603**	**Year:**	**1998**

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

Max Power, Max modulation.

EUT OPERATING MODES

Simultaneous Transmission from RFID, 802.11b, & CDMA

DEVIATIONS FROM TEST STANDARD

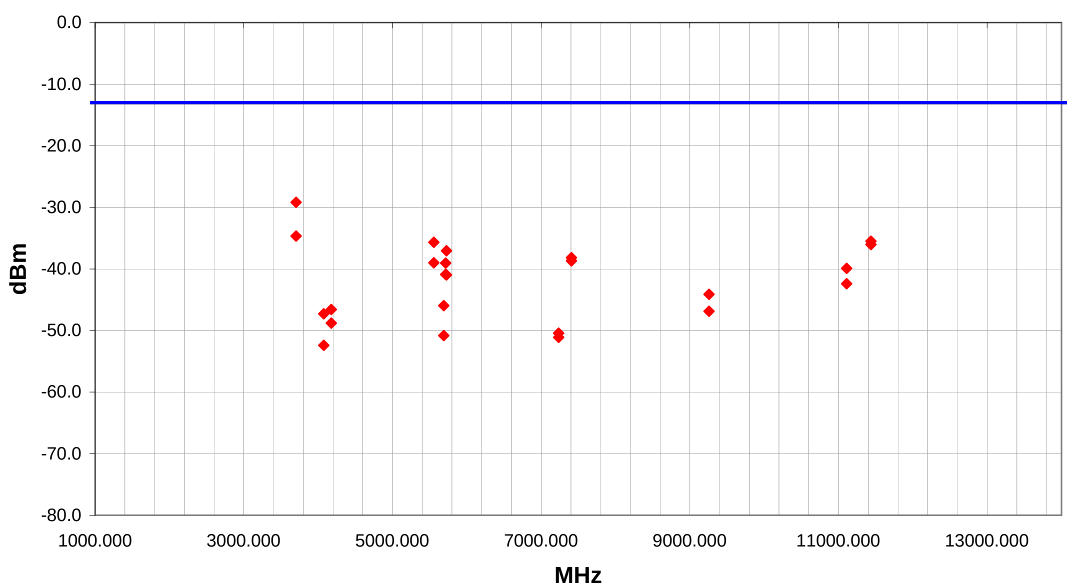
No deviations.

RESULTS

RESULTS	Run #
Pass	**2**

Other

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector		EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
3703.500			78.0	1.1			H-Horn	PK		-29.2	-13.0	-16.2	RFID 69, PCS 41, 802.11b 11
3703.500			247.0	1.2			V-Horn	PK		-34.7	-13.0	-21.7	RFID 69, PCS 41, 802.11b 11
11435.700			134.0	1.3			H-Horn	PK		-35.5	-13.0	-22.5	RFID 62, PCS 1117, 802.11b 11
5555.999			74.0	1.2			V-Horn	PK		-35.7	-13.0	-22.7	RFID 69, PCS 41, 802.11b 11
11435.700			300.0	1.3			V-Horn	PK		-36.0	-13.0	-23.0	RFID 62, PCS 1117, 802.11b 11
5727.400			263.0	1.2			V-Horn	PK		-37.1	-13.0	-24.1	RFID 12, PCS 1182, 802.11b 1
7408.199			200.0	1.2			V-Horn	PK		-38.2	-13.0	-25.2	RFID 69, PCS 41, 802.11b 11
7408.199			114.0	1.3			H-Horn	PK		-38.7	-13.0	-25.7	RFID 69, PCS 41, 802.11b 11
5555.999			124.0	1.3			H-Horn	PK		-39.0	-13.0	-26.0	RFID 69, PCS 41, 802.11b 11
5716.600			254.0	1.2			V-Horn	PK		-39.1	-13.0	-26.1	RFID 62, PCS 1117, 802.11b 11
11110.500			153.0	1.3			H-Horn	PK		-39.9	-13.0	-26.9	RFID 69, PCS 41, 802.11b 11
5716.600			27.0	1.1			H-Horn	PK		-40.9	-13.0	-27.9	RFID 62, PCS 1117, 802.11b 11
5727.400			155.0	1.3			H-Horn	PK		-41.0	-13.0	-28.0	RFID 12, PCS 1182, 802.11b 1
11110.500			301.0	1.2			V-Horn	PK		-42.4	-13.0	-29.4	RFID 69, PCS 41, 802.11b 11
9258.750			2.0	1.3			H-Horn	PK		-44.1	-13.0	-31.1	RFID 69, PCS 41, 802.11b 11
5689.630			262.0	1.2			V-Horn	PK		-46.0	-13.0	-33.0	RFID 8, PCS 932, 802.11b 11
4175.981			18.0	1.1			H-Horn	PK		-46.6	-13.0	-33.6	RFID 62, PCS 1117, 802.11b 11
9258.750			143.0	1.2			V-Horn	PK		-46.9	-13.0	-33.9	RFID 69, PCS 41, 802.11b 11
4075.970			9.0	1.7			H-Horn	PK		-47.3	-13.0	-34.3	RFID 50, PCS 1117, 802.11b 1
4175.981			267.0	1.1			V-Horn	PK		-48.8	-13.0	-35.8	RFID 62, PCS 1117, 802.11b 11
7236.000			224.0	1.3			H-Horn	PK		-50.4	-13.0	-37.4	RFID 12, PCS 1182, 802.11b 1
5689.630			182.0	1.3			H-Horn	PK		-50.8	-13.0	-37.8	RFID 8, PCS 932, 802.11b 11
7236.000			79.0	1.2			V-Horn	PK		-51.1	-13.0	-38.1	RFID 12, PCS 1182, 802.11b 1
4075.970			117.0	1.2			V-Horn	PK		-52.4	-13.0	-39.4	RFID 50, PCS 1117, 802.11b 1

NORTHWEST
EMC

Apparent Power Data Sheet

REV
df4.01
10/02/2003

EUT:	**700C (CDMA/8012.11b/RFID)**	**Work Order:**	**ITRM0004**
Serial Number:		**Date:**	**11/21/03**
Customer:	**Intermec Technologies Corporation**	**Temperature:**	**70**
Attendees:	**Scott Holub**	**Humidity:**	**52%**
Cust. Ref. No.:		**Barometric Pressure**	**30.11**
Tested by:	**Greg Kiemel** **Power:** **120 V, 60 Hz**	**Job Site:**	**EV01**

TEST SPECIFICATIONS

Specification:	**FCC 24.238(a)**	**Year:**	**2003**
Method:	**TIA/EIA-603**	**Year:**	**1998**

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

Max Power, Max modulation.

EUT OPERATING MODES

Simultaneous Transmission from RFID, 802.11b, CDMA (PCS band)

DEVIATIONS FROM TEST STANDARD

No deviations.

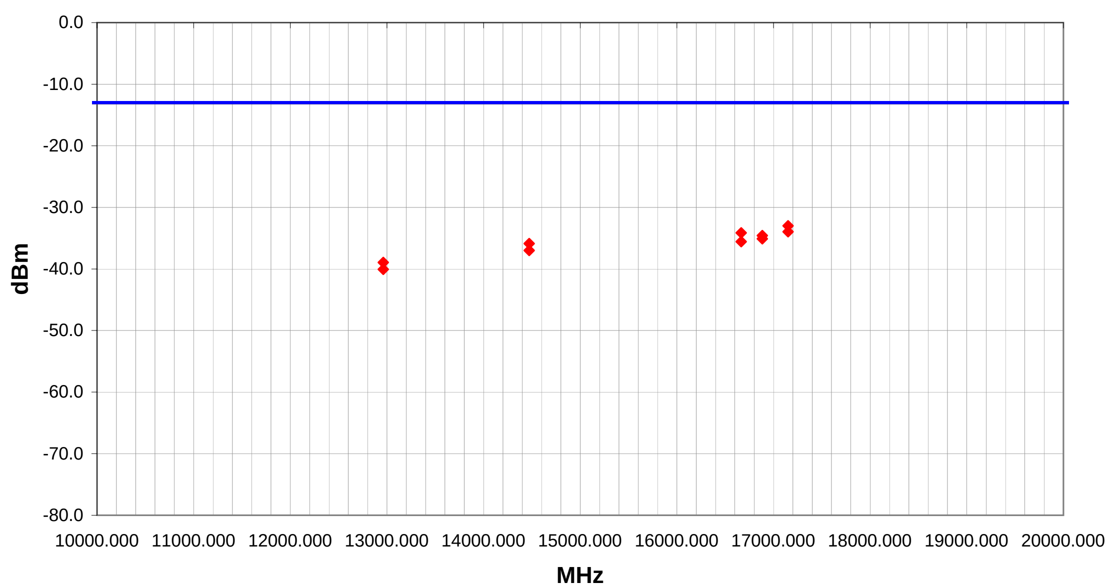
RESULTS

Run # 3

Pass

Other

Tested By:



Freq (MHz)	Azimuth (degrees)	Height (meters)	Polarity	Detector	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
17149.910	111.0	1.2	V-Horn	PK	-33.0	-13.0	-20.0	RFID 7, PCS 1117, 802.11b 11
17149.910	53.0	1.1	H-Horn	PK	-33.9	-13.0	-20.9	RFID 7, PCS 1117, 802.11b 11
16665.750	347.0	1.2	V-Horn	PK	-34.1	-13.0	-21.1	RFID 69, PCS 41, 802.11b 11
16884.000	99.0	1.2	V-Horn	PK	-34.6	-13.0	-21.6	RFID 12, PCS 1182, 802.11b 1
16884.000	335.0	1.3	H-Horn	PK	-35.1	-13.0	-22.1	RFID 12, PCS 1182, 802.11b 1
16665.750	312.0	1.3	H-Horn	PK	-35.6	-13.0	-22.6	RFID 69, PCS 41, 802.11b 11
14472.000	130.0	1.3	H-Horn	PK	-35.9	-13.0	-22.9	RFID 12, PCS 1182, 802.11b 1
14472.000	176.0	1.2	V-Horn	PK	-37.0	-13.0	-24.0	RFID 12, PCS 1182, 802.11b 1
12962.250	207.0	1.3	H-Horn	PK	-39.0	-13.0	-26.0	RFID 69, PCS 41, 802.11b 11
12962.250	142.0	1.2	V-Horn	PK	-40.1	-13.0	-27.1	RFID 69, PCS 41, 802.11b 11

Apparent Power Data Sheet

EUT:	700C (CDMA/8012.11b/RFID)	Work Order:	ITRM0004
Serial Number:		Date:	11/26/03
Customer:	Intermec Technologies Corporation	Temperature:	70
Attendees:	none	Humidity:	48%
Cust. Ref. No.:		Barometric Pressure	29.95
Tested by:	Rod Peloquin Power: 120 V, 60 Hz	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC 24.238(a)	Year:	2003
Method:	TIA/EIA-603	Year:	1998

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

Max Power, Max modulation

EUT OPERATING MODES

Simultaneous Transmission from RFID, 802.11b, CDMA (PCS)

DEVIATIONS FROM TEST STANDARD

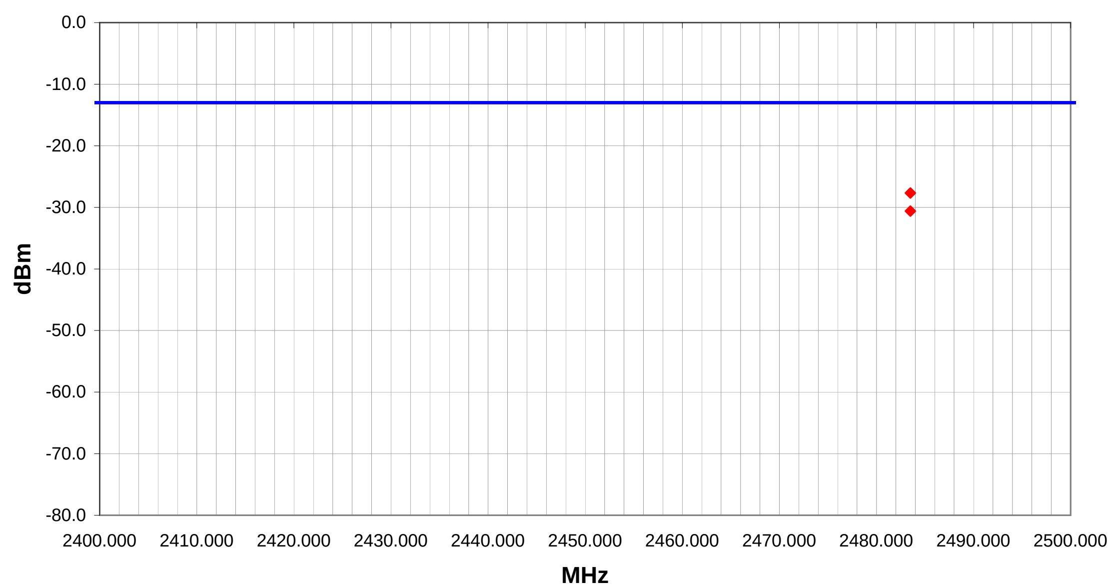
No deviations.

RESULTS

RESULTS	Run #
Pass	6

Other

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector		EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
2483.500			95.0	1.1			V-Horn	PK		-27.7	-13.0	-14.7	RFID 7, PCS 1182, 802.11b 11
2483.500			25.0	1.3			H-Horn	PK		-30.6	-13.0	-17.6	RFID 7, PCS 1182, 802.11b 11

NORTHWEST
EMC

Apparent Power Data Sheet

REV
df4.01
10/02/2003

EUT:	**700C (CDMA/8012.11b/RFID)**			**Work Order:**	**ITRM0004**
Serial Number:				**Date:**	**11/26/03**
Customer:	**Intermec Technologies Corporation**			**Temperature:**	**72**
Attendees:	**none**			**Humidity:**	**52%**
Cust. Ref. No.:				**Barometric Pressure**	**30.08**
Tested by:	**Rod Peloquin**	**Power:**	**120 V, 60 Hz**	**Job Site:**	**EV01**

TEST SPECIFICATIONS

Specification:	**FCC 24.238(a)**	**Year:**	**2003**
Method:	**TIA/EIA-603**	**Year:**	**1998**

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

Max Power, Max modulation

EUT OPERATING MODES

Simultaneous Transmission from RFID, 802.11b, CDMA (PCS)

DEVIATIONS FROM TEST STANDARD

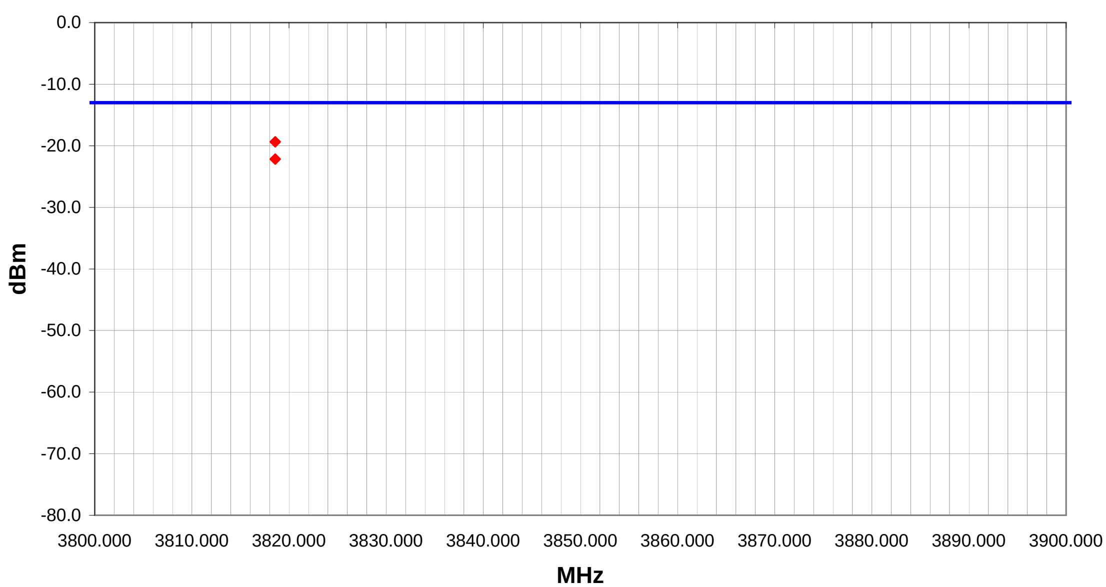
No deviations.

RESULTS	**Run #**
Pass	**7**

Other

CDMA harmonic

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector		EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
3818.580			266.0	1.2			H-Horn	PK		-19.3	-13.0	-6.3	RFID 7, PCS 1182, 802.11b 11
3818.580			202.0	1.2			V-Horn	PK		-22.2	-13.0	-9.2	RFID 7, PCS 1182, 802.11b 11

Test Setup Photos with 805-606-002 Antenna
Cellular Band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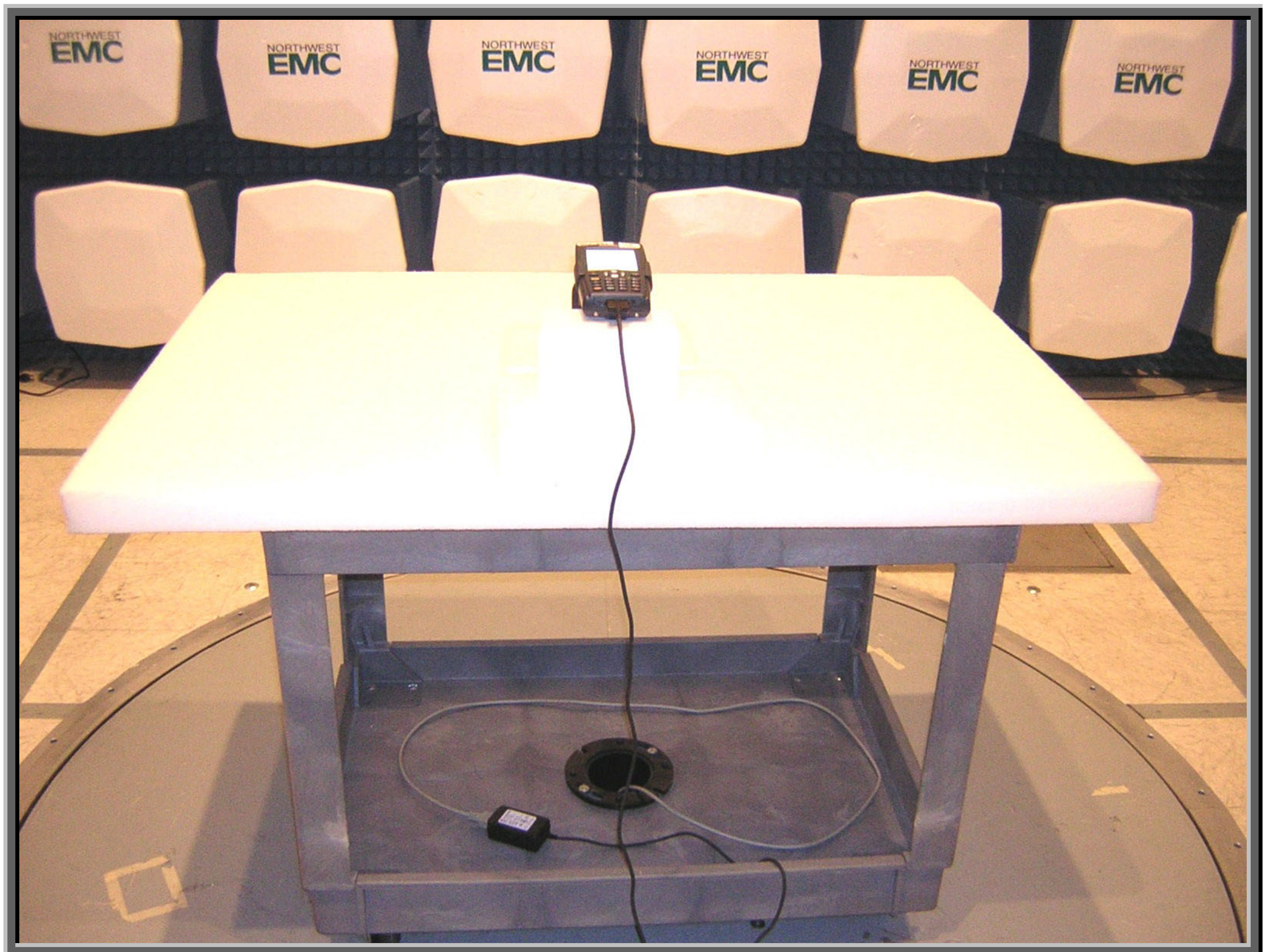
NORTHWEST
EMC

Test Setup Photos with 805-606-004 Antenna
PCS Band


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